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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,638	10/19/2001	David Patrick Magee	TI-32986	8619

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
JAMAL, ALEXANDER	

ART UNIT	PAPER NUMBER
2643	

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/044,638	MAGEE ET AL.	
	Examiner	Art Unit	
	Alexander Jamal	2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Based upon the submitted amendment (4-20-2005), the examiner notes that no claims have been amended and only arguments presented.

2. Examiner maintains previous rejections and submits response to applicant's arguments.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-11,13,14,16-31** rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir et al. (6795409) and further in view of Raleigh (6006110).

As per **claim 1,** Youssefmir discloses a communication system with data and training signals configured as shown in Fig. 5C, 5D (Col 25 lines 50-67, Col 26 lines 50-60). The system may use pilot tones sent with each data packet in order to determine weighting factors (for noise mitigation) for the base station (Col 27 lines 43-55). When training tones are used, the system inherently comprises a training tone extractor to extract training tones from the received data signal. However, Youssefmir does not

disclose the specifics of the antenna training including a noise estimator computing a noise estimation based on the training signals.

Raleigh discloses a communications system using a blind adaptive technique to reduce interference and multipath fading (noise). Raleigh discloses that the technique may be used with training tones (Col 7 lines 40-47) to improve communication quality, and account for multipath fading (Col 3 lines 40-60). The system further comprises a noise estimator (Col 8 lines 35-45) to estimate the noise (SNR) of the received signals (Col 8 lines 10-25). The estimates are used by a beamformer (Col 5 line 50 to Col 6 line 8). It would have been obvious to one of ordinary skill in the art at the time of this application to implement Raleigh's noise reducing method for the purpose of improving communication quality, and accounting for multipath fading.

As per **claim 14,** claim rejected for same reasons as claim 1 rejection. The training signals are the first type of carrier signal. The system adaptively (iteratively) correlates the received signal training tone with itself and tones from other channels (auto and cross-correlation) (RALEIGH: Col 15 lines 25-65, Col 16 line 65 to Col 17 line 15).

As per **claim 16,** claim rejected for same reasons as claim 14 rejection. The system uses the noise indication, and channel estimates (via inputs) in a beamforming system (RALEIGH: Col 6 lines 45-65). Since the system relies upon a serial bitstream to recover the data and training tones, the system inherently comprises a selector (indexing

function) (such as a timing clock signal) to determine the predetermined spacing of data signals and training signals (such as is defined in Youssefmir Fig. 5C,5D).

As per **claim 18,** claim rejected for same reasons as claim 16 rejection. The system further comprises antenna 56 (RALEIGH: Fig. 3) and the means to convert the received antenna signal into a digital signal in the frequency domain (RALEIGH: Col 6 lines 30-45, Col 11 lines 15-30, note the phase term in line 22). Additionally, Youssefmir's system may be an FDMA or FDD system (YOUSSEFMIR: Col 28 lines 35-40), and Fig. 5D discloses that the training tone signals are fewer in number than the data signals.

As per **claim 22,** claim rejected for same reasons as claim 16 rejection.

As per **claim 25,** claim rejected as a method performed by the device of the claim 16 rejection.

As per **claims 2,26,** the noise estimator computes the difference (error signal) between a received training signal and a previous training signal (RALEIGH: Col 15 lines 25-40).

As per **claim 3,** the system performs cross correlation (RALEIGH: Col 16 lines 65-67) on the training signals from multiple channels (interference) (RALEIGH: Col 14

lines 50-65) to calculate the covariance (indication). The system comprises an index for the same reasons as the claim 16 rejection.

As per **claims 4,27,** the system calculates the variance and covariance (RALEIGH: Col 11 lines 40-56).

As per **claims 5,28,** the system time averages the covariance (RALEIGH: Col 15 lines 1-10).

As per **claims 6-8,** claims rejected for same reasons as claim 16 rejection.

As per **claims 9,21,24,30,** Youssefmir discloses (Fig. 5D) that each data packet is sent with an associated training signal adjacent to the data packet (nearest to).

As per **claims 10,17,** the system calculates soft decisions and noise to signal (SINR) for each of the tones (RALEIGH: Col 14 lines 10-21).

As per **claim 11,** the system may be a multiple-carrier communications system (RALEIGH: Col 10 line 55 to Col 11 line 5) (Youssefmir: Col 29 lines 1-7).

As per **claims 13,31,** Raleigh discloses the fact that the system uses a DSP (that inherently comprises executable instructions for the purpose of controlling the DSP).

As per **claims 19,20,23,29,** claims rejected for same reasons as claim 18 rejection.

5. **Claims 12,32** rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir et al. (6795409) and Raleigh (6006110) as applied to claims 1,24.

As per **claims 12,32,** Raleigh discloses applicant's claims 1,24, and the fact that the system uses a DSP (that inherently comprises executable instructions for the purpose of controlling the DSP). However, Raleigh does not disclose that the system be implemented as an ASIC.

It would have been obvious to one of ordinary skill in the art at the time of this application that all the digital circuitry could be implemented as ASIC for the purpose of saving cost.

6. **Claim 15** rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir et al. (6795409) and Raleigh (6006110) as applied to claim 14, and further in view of Tellado et al. (6711412).

As per **claim 15,** Youssefmir and Raleigh discloses applicant's claim 1, and further disclose claim 15 for the same reasons as claim 16 and 11 rejections. However, they do not specify that zero tones be used as part of the signaling.

Tellado discloses a multiple carrier noise mitigation system for mobile terminals that uses zero tones to increase separability between the received signals (Col 4 lines 59-67). It would have been obvious to one of ordinary skill in the art at the time of this application to utilize zero tones in the system for the purpose of increasing the separability of the received signals.

Response to Arguments

7. Applicant's arguments filed 4-20-2005 have been fully considered but they are not persuasive.

As per applicant's argument that the weighting factors disclosed in Youssefmir are not for noise mitigation (remarks pages 8-9), examiner does not agree. Youssefmir discloses (Col 5 line 65 to Col 6 line 22) that the weighting factors allow for a smart antenna processing strategy that that is used to enhance interference mitigation. Youssefmir discloses that a least squares method may be used with the training signals to optimize some criterion based on an error signal.

As per applicant's argument that there is not a training data extractor (remarks page 9), examiner disagrees. In order to derive the weighting factors from the training signals (as described directly above), the training tones must be read (extracted) from the incoming data stream.

As per applicant's argument that Youssefmir and Raleigh do not disclose a noise estimator to estimate noise on training signals. Raleigh is relied upon to teach a specific and advantageous method of optimizing received antenna array signals based upon the signal to noise ratio estimate. Examiner contends that a signal to noise estimate inherently comprises a noise estimate as per the definition of signal-to-noise. Additionally, examiner notes that Raleigh discloses that the optimization technique may be carried out in a blind mode (without training signals), or specifically on training signals (as noted in the original claim 1 rejection). Raleigh's training tones would have to be isolated in the same manner as the training tones described by Youssefmir.

As per applicant's arguments that Raleigh does not disclose elements of claim 2 (remarks page 10), examiner directs applicant to the original claim 1 rejection above which discloses that Raleigh's method may be applied to training signals. The training tones (and as such, any statistical operations performed on a tone and a previous tone) are indexed as they have a specific timeslot in the datastream.

As per applicant's arguments that Raleigh and Youssefmir do not disclose an indexing of the training signals as per claim 3 (remarks pages 10-11), examiner disagrees. Youssefmir discloses a structure in Figs. 5C and 5D where the training signals have a known time position relative to the data signals. The training signals must be indexed in order to separate them from the data.

As per applicant's arguments that Raleigh does not disclose a second noise estimator as per claim 4 (remarks page 11), examiner disagrees. Examiner reads the Covariance detection as a second noise estimator.

As per applicant's remarks that Raleigh does not teach a time averager for the indication from the second noise estimator as per claim 5 (remarks page 11), examiner disgrees for the same reasons as the response to the claim 4 argument response.

As per applicant's arguments that none of the cited references teaches beamforming based on a noise estimation for a training tone nearest each respective 'other type' of tone (remarks pages 11-12). Examiner notes that the rejections of claims 16,14 and 1 were used to support the rejection of claim 6. Since the systems of both cited references adaptively update the beamforming (antenna strategy) based upon received training signals, the antenna strategy will be updated with each new training signal, and

as such, that strategy will be applied to the data signals ('other type of tone') nearest the most recent training signal. Additionally, the inter-channel correlation described in the claim 14 rejection, when applied to the training signals between channels could also be read on claim 6. Additionally, Raleigh discloses that training signals may be used in conjunction with data signals as part of the estimation and adaptation method (Raleigh: Col 7 lines 40-46).

As per applicant's arguments that Youssefmir does not meet the limitation of claim 9 (remarks page 12), examiner disagrees. Since the systems of both cited references adaptively update the beamforming (antenna strategy) based upon received training signals, the antenna strategy will be updated with each new training signal, and as such, that strategy will be applied to the data signals ('other type of tone') nearest the most recent training signal.

As per applicant's arguments that the Raleigh reference does not disclose the elements of claim 14 (remarks page 12). Examiner notes that one type of carrier signals are noted as the training signals in the original claim 14 rejection. Again, the examiner notes that Raleigh discloses that the training signals may be used in conjunction with or in lieu of the data signals for the beamforming process.

As per applicant's arguments that the claim 6 rejection does not discloses the elements of claim 16 (remarks pages 12-13). Since the systems of both cited references adaptively update the beamforming (antenna strategy) based upon received training signals, the antenna strategy will be updated with each new training signal, and as such, that strategy will be applied to the data signals ('other type of tone') nearest the most

recent training signal. Additionally, the inter-channel correlation described in the claim 14 rejection, when applied to the training signals between channels could also be read on claim 16. Additionally, Raleigh discloses that training signals may be used in conjunction with data signals as part of the estimation and adaptation method (Raleigh: Col 7 lines 40-46). Examiner notes that (RALEIGH: Col 6 lines 45-65) discloses one input, with the other input being disclosed by claim 1. Examiner further notes that both Youssefmir and Raleigh receive data bursts, and as such, the act of receiving the data bursts will give an 'indication of channel estimates' for that received data burst.

As per applicant's arguments regarding dependant claims 17,18,19-24,25,26-32,15, examiner notes that the responses to arguments pertaining to claims 14 and 16 apply to claims 17,18,19-24,25,26-32,15.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 571-272-7498. The examiner can normally be reached on M-F 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 571-272-7499. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9315 for After Final communications.

CURTIS KUNTZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

AJ
June 15, 2005